

REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated July 16, 2004 (U.S. Patent Office Paper No. 5). In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Applicant respectfully thanks the Examiner for his kind consideration in conducting a personal interview with Applicant and Applicant's representatives on October 1, 2004, and for all his helpful comments and suggestions made during the interview.

Status of the Claims

As outlined above, claims 1 - 18 are being canceled without prejudice or disclaimer, while new claims 19 to 34 are hereby submitted for consideration. Support for the claims being submitted herewith may be found throughout the specification and drawings. Applicant hereby submits that no new matter is being introduced into the application through the submission of this response.

Formal Objections or Rejections

The Examiner objected to the Abstract of the Disclosure on the grounds that the current Abstract is too long. Since Applicant is hereby submitting a substitute Abstract, this objection is hereby obviated and rendered moot.

Claims 1 and 5 were objected to for a minor informality, while claims 1 - 12 were rejected under 35 U.S.C. §112, second paragraph, for being indefinite. In view of the cancellation of claims 1 - 18 without prejudice or disclaimer as outlined above, Applicant will submit that the above objection and rejection are rendered moot.

However, to the extent that any terms in the claims relating to file-basis data format, block-basis data format, file I/O requests, block I/O requests require any clarification, Applicant is hereby submitting "The Design and Implementation of the 4.4BSD Operating System"(Addison-Wesley Publishing Company (April 30, 1996) ISBN: 0201549794) that explains "block I/O" is an I/O to a block device and "block device" is a random-access mass-storage device that supports a block-oriented interface; and "The Internals of UNIX System V Release 4 An Open Systems Design"(by B. Goodheart, J Cox; Prentice Hall; ISBN: 0132075563 ; (1995/10/01)) that explains that file I/O read or write of data from or to file on

a file system, for consideration. Further, Applicant will submit that the terms in the claims are fully supported in the disclosure of the invention, including the terms “block data” and “file data”, which are defined in the specification (see page 9 line 10-12), and “block,” “file,” “block I/O,” and “file I/O” are common words known to those of skill in the field of data storage systems.

The Examiner pointed out that, to the extent that any terms in claims, “transforming [...] the block data into a file data format” is not supported in the specification and is indefinite, specifically the Examiner said the specification does not disclose transforming block data to file data for inputting into the disk drives of data storage system due to broad original claim 1 during the interview. However, the specification of this application clearly explains the operation of “transforming.” (see page 14 line 1-18) The applicant will replace claim 1 with claim 33 to make clarify so that the control unit of the present invention transforms file data into block data for storing in the disk drives and transforms the block data back into file data for outputting.

Prior Art Rejections

The Examiner rejected claims 13 and 15-18 under 35 U.S.C. § 102(e) as being anticipated by Shimbo et al. (US Patent No. 6,760,840). Further, the Examiner rejected claim 14 under 35 U.S.C. § 103(a) as being unpatentable over Shimbo '840 in view of Rowlands (US Patent No. 6,636,982). Applicant respectfully traverses these rejections.

The present invention as now claimed is directed to a storage system to be coupled to an IP network. The storage system comprises an input/output unit coupled to the IP network; a control unit coupled to the input/output unit; and a plurality of disk drives coupled to the control unit. The input/output unit is assigned to a first identifier for receiving block I/O requests via the IP network and is assigned to a second identifier for receiving file I/O requests via the IP network. The plurality of disk drives are configured into a plurality of volumes each of which is designated to store either data related to the block I/O requests or data related to the file I/O requests.

The present invention as recited in new claim 22 is directed to a storage system to be coupled to an IP network, the storage system comprising an input/output port to be coupled to the IP network; a control unit coupled to the input/output port; and a plurality of disk drives coupled to the control unit, wherein the input/output port is assigned to a first identifier for receiving block I/O requests via the IP network and is assigned to a second identifier for receiving the file I/O requests via the IP network. The plurality of disk drives are configured

into a plurality of volumes, at least two of which are designated to store either data related to the block I/O requests or data related to the file I/O requests.

The present invention as recited in claim 25 is directed to a storage system to be coupled to an IP network, wherein the storage system comprises a port to be coupled to the IP network; a control unit coupled to the port; and a plurality of disk drives coupled to the control unit. The port is assigned to a first identifier for receiving a block I/O request from a first processor coupled to the IP network and is assigned to a second identifier for receiving a file I/O request from a second processor coupled to the IP network. The plurality of disk drives are configured into a plurality volumes, a first volume of the volumes is designated to store data related to the block I/O and a second volume of the volumes is designated to store data related to the file I/O request. The first processor accesses the first volume of the volumes with the first identifier assigned to the port and the second processor accesses the second volume of the volumes with the second identifier assigned to the port.

Lastly, the present invention as recited in claim 28 is directed to a storage system to be coupled to a network. The storage system comprises an input/output unit to be coupled to the network; a control unit coupled to the input/output unit; and a plurality of disk drives coupled to the control unit. The input/output unit is assigned to a first identifier for receiving block I/O requests through the network and is assigned to a second identifier for receiving file I/O requests through the network. The plurality of disk drives are configured into a first volume and a second volume each of which is assigned to the first identifier and the second identifier so that the first volume stores data related to the block I/O requests and the second volume stores data related to the file I/O requests.

As discussed during the interview, the present invention is directed to overcoming the limitations in the technology presently used in the industry. Specifically, as is well known in the data storage technology industry, there are currently two competing technologies for how data is transferred from computer to computer, system to system, and network to network. One such technology is embodied as a Network Attached Storage (NAS) system wherein data is transferred between servers and storage systems using a file-basis data format, wherein data is transferred (i.e., inputted and outputted) using a file-basis data format, and stored in a block-basis data format. When data in the file-basis format is received, it is converted or transformed into block-basis data format for storage. When stored data is to be outputted, that stored data in the block-basis format is converted or transformed into file-basis data format.

Another technology is based on the Storage Area Network (SAN) system wherein data is transferred using a block-basis data format, and stored in a block-basis data format.

Currently, in the prior art, these two technologies or systems have operated or been operated independently of one another. In other words, data in these two different formats cannot be stored together.

Also currently, no one in the prior art has developed any system capable of transferring data in both formats wherein the data is handled by a single system. Rather, the systems known in the prior art simply do not address the need for combining these two systems or at best are simply the two systems working in parallel but otherwise separate from one another.

This is discussed generally in the Background of the Invention portion of the application.

The broad scope of the invention is to have a data storage system that incorporates a input/output unit that communicates with an Internet Protocol (IP) network. That I/O unit is able to receive I/O requests for both file-basis and block-basis data formats, and to handle the inputting and outputting of data received and transmitted, respectively, in both formats. Internally, the storage system manages logical volumes of storage, wherein data received in file-basis data format is converted into block-basis data format and stored in logical storage volumes designated to store block-basis data derived from data received in file-basis data format. Support for these features may be found at least on p. 14 line 1 to line 18 and p. 18, line 3 to p. 19, line 15.

One feature of the present invention as recited in the claims that embodies the advantage of being able to handle both types of data formats is that the I/O unit is assigned to a first identifier for receiving block I/O requests through the IP network and is assigned to a second identifier for receiving file I/O requests through the IP network. Support for the embodiments of the present invention as claimed may be found in Figures 6 and 13, and in the specification at least on p. 21, lines 6 - 11.

In contrast to the present invention as now claimed, the prior art references cited by the Examiner are directly to systems different from the present invention as now claimed and that do not address any of the problems or advantages to which the present invention is directed.

In particular, Shimbo '840 is merely directed to a file management server device that enciphers in units of blocks, and a client device obtains the block data of the desired file in

enciphered state, decipheres the obtained block data in units of blocks, carries out an editing of the desired file to obtain editing data, enciphers the editing data in units of blocks, and transmits the enciphered editing data to the file management server device (See Abstract).

This reference is related only to enciphering and deciphering block data comprising a file, and thus does not and cannot disclose, teach or suggest a input/output unit that is assigned identifiers for receiving block I/O requests and file I/O requests. Consequently, Shimbo '840 cannot anticipate or render obvious each and every feature of the present invention as claimed. The present invention as a whole is distinguishable and thereby allowable in view of Shimbo '840.

Rowlands '982 is merely a secondary reference that is directed to an apparatus and methods for detecting failure of a node in a cluster computer system; the data format about SCSI is disclosed in Table 19. This reference falls far short of making up for the deficiencies in Shimbo '840 such that the combination of these two references could render each and every feature of the present invention obvious to one of skill in the art, as Shimbo '840 is not even relevant to the present invention as a whole. Rather, the present invention as claimed is allowable over the combination of Shimbo '840 and Rowlands '982.

With respect to the references cited in the Information Disclosure Statement filed September 3, 2004, and as discussed during the Examiner Interview on October 1, 2004, Applicant will submit that the two references discussed, US Application No. 09/829,470 to Yamamoto and US Patent No. 5,634,111 to Oeda et al.. Yamamoto '470 is not prior art to the present invention under 35 U.S.C. § 102, since the assignee of two applications is the same, Hitachi, Ltd., and the present application filed to the USPTO prior to the publication date of Yamamoto '470. The two references are also distinguishable from the present invention as claimed.

As discussed during the interview, these references also does not disclose among other features, an input/output unit that is assigned identifiers for receiving block I/O requests and file I/O requests. Consequently, Oeda '111 cannot anticipate or render obvious each and every feature of the present invention as claimed. The present invention as a whole is distinguishable and thereby allowable in view of these additional references.

Conclusion

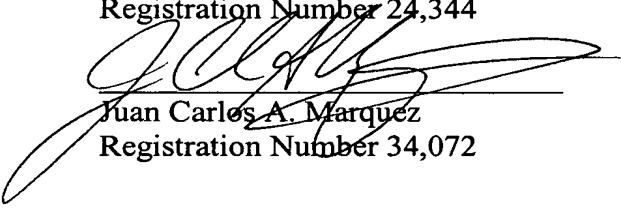
In view of all the above, Applicant respectfully submits that certain clear and distinct differences as discussed exist between the present invention as now claimed and the prior art

references upon which the rejections in the Office Action rely. These differences are more than sufficient that the present invention as now claimed would not have been anticipated nor rendered obvious given the prior art. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicant's undersigned representative at the address and phone number indicated below.

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